ABSTRACT

Please replace the original abstract with the following abstract:

A capacitive sensor system for controlling operation of a device in response to a rate of change in capacitance due to motion of a proximate object includes at least two sense electrodes disposed on a surface and a phase locked loop, including a voltage controlled oscillator and a phase/frequency comparator, connected between the sense electrodes and an RC network for providing an operating frequency to the sense electrodes. A circuit loop, including a reference oscillator, provides a fixed frequency reference for the phase locked loop to follow and a phase delay circuit connected between ~~said~~ the phase/frequency comparator and ~~said~~ the voltage controlled oscillator causes the voltage controlled oscillation to run ahead of the reference oscillator. A trigger circuit provides a control output in response to a change in phase shift between ~~said~~ the fixed frequency and the operating frequency.

On page 17, delete the paragraph added by the preliminary amendment and insert thereafter.

Where:
Φ_{en}= the normalized phase error
C_v= the capacitance formed by the capacitor C1 on the circuit diagram depicted in figure 2, in conjunction with the capacitance of the sense electrodes and capacitance to the shield (if present) and stray board capacitance.
T_{delay}= the time delay corresponding to the phase delay due to element 34.
ω_n= the natural response frequency of the circuit. ~~and is given by:~~

On page 20, replace the paragraph inserted by preliminary amendment with the following paragraph:

Figure 3 depicts a block diagram of the sensor electronics 40 in accordance with an alternative embodiment of the present invention, and includes common reference numbers depicting identical or subsequently similar elements described in connection with embodiment 10 shown in Figure 1. In this embodiment 40, the trigger is based on a voltage comparator 42. This is an alternate method of detection and uses the control circuit of the phase locked loop (PLL) 12. The operation is as follows: As with embodiment 10 shown in figure 1, the average control voltage is the voltage required to cause the VCO 22 to operate at the same frequency, after division, as the reference oscillator 32. In this embodiment however there is no phase delay network and instead phase shift errors will cause the phase/frequency comparator 24 to increase or

decrease the control voltage 102 until the phase difference is corrected to zero. In this arrangement 40 the phase error signal from the phase/frequency comparator 24 is filtered by a first loop filter which may comprise an RC network 44 and is also filtered by a second filter which may also comprise an RC network 105 and which has a much longer time constant than the first RC network and which provides a voltage reference to the comparator 42. When the control voltage 102 reaches//,// positive going voltage threshold at the comparator 42, due to detection of a moving object within the activation region of the sense electrodes 14 and 16, the comparator 42 actuates and provides the sensor output trigger signal.

On page 28, please replace the paragraph beginning at line 26 with the following paragraph:

It should be appreciated that the above tests are technical or 'staged' in the sense that care was taken to keep the hand flat and level, which typical users of a soap dispenser would not do, also hand speed is an important factor and this was based on judgment of what might ~~by~~ be typical and this would vary in actual use. One can see that according to these data the effective activation distance is in the region of 2.5" to 3" and that this is also in agreement with the technically based estimate. Similarly one can see that there was zero incidence of false triggers meaning that at no time was the sensor activated by hand removal.